



## **Massachusetts 1999 Striped Bass Fisheries Monitoring Report**

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### **Introduction**

This report characterizes the commercial and recreational striped bass fisheries conducted in Massachusetts during 1999. Statewide monitoring programs, which are considered to be essential elements of the long-term management approach described in Section 5 of the Atlantic States Marine Fisheries Commission's (ASMFC) Fisheries Management Report No. 24 (Amendment #5 to the Interstate Fishery Management Plan for Atlantic Striped Bass (IFMP)), were used to collect this information. Several data sources were used to estimate harvest, total catch (which include fish caught but released alive), and catch composition (size, sex, and age). These included Massachusetts Division of Marine Fisheries (DMF) and National Marine Fisheries Service (NMFS) based programs (Diodati, 1990).

The recreational harvest in 1999 as well as the number of fish caught and released decreased significantly from levels in 1998. The estimate of fishing trips conducted in the recreational fishery also decreased from the 1998 value. The number of fish caught and released was 4.7 million, representing about one-third of the coast-wide total number of fish caught and released in 1999. The 1999 commercial harvest (788,171 pounds) slightly exceeded the ASMFC allowable quota of 782,000 pounds. Fishing effort increased in the commercial fishery, although the number of fish harvested was lower than in 1998. Total removals by Massachusetts fisheries in 1999 decreased 33% from 1998 values.

## **Harvest and Losses**

### **Commercial Fishery**

Season: 40 d between July 5 – September 6 and a one-day opening on September 19. No landings were permitted on Thursday-Saturday.

Harvest: 788,171 pounds (against a harvest quota of 782,000 pounds).

Allowable Gear Type: Hook and line.

Minimum Size: 34 inches total length.

Licensing and Reporting: To purchase striped bass directly from fishermen, fish dealers are required to obtain special authorization from the DMF in addition to standard seafood dealer permits. Dealer reporting requirements include weekly telephone reports of all striped bass purchases; DMF administers a toll-free number and an interactive voice response system for this purpose. Following the close of the season, dealers are also required to provide a written transcript consisting of purchase dates, number of fish, pounds of fish, and names and permit numbers of fishermen from whom they purchased.

Fishermen must have a DMF commercial fishing permit (of some type) and a special striped bass fishing permit to sell their catch. They are also required to file catch reports at the end of the season, which include the name of the dealer(s) that they sell to and extensive information describing their catch composition and catch rates on a monthly basis. In addition, fishermen are asked to provide daily fishing logs on a voluntary basis.

Methods: The dealer telephone survey is used for real-time monitoring of landings, while the dealer written transactions are used to estimate the final landings figure. Information from catch reports and voluntary logs is used to characterize effort, disposition of the catch, catch weight, and size composition by catch category.

Data from 2,256 fish sampled from the 1999 commercial harvest and the on-going DMF diet study was used to construct a functional geometric regression of weight on length. The following weight-length relationship was derived:

$$W = 0.000394197 * L^{2.968974} \quad (1)$$

where W equals weight in pounds and L equals total length in inches. Expression (1) was used to estimate any missing length or weight values.



### Harvest Levels and Catch Composition

Dealer transcripts show 788,171 pounds (40,838 fish) were harvested during 1999 (Box 1). Size composition of the commercial catch by category of disposition is presented in Tables 1 (numbers of fish) and 1A (pounds of fish). The “Consumed” category represents what commercially licensed anglers harvested for personal use and is counted as a recreational loss later in this report. Some commercial license holders, as in past years, reported releasing legal-size fish during the commercial season . This category represented 7.3% of the total catch. About 33% of the total catch exceeded the legal minimum of 34 inches.

#### **Box 1. Attributes of the Massachusetts Striped Bass Commercial Fishery: 1990-1999.**

SEASON	SEASON LENGTH (D)	HARVEST (LBs/NOs) 000s	DEALER PERMITS	FISHING PERMITS
1990	93	160.6/6.3	95	1,498
1991	59	234.8/10.4	92	1,739
1992	39	239.2/11.3	135	1,861
1993	35	262.6/13.0	152	2,056
1994	24	199.6/10.4	150	2,367
1995	57	782.0/41.2	161	3,353
1996	42	696.8/38.3	179	3,801
1997	42	785.9/44.8	173	5,500
1998	28	822.0/45.3	180	5,540
1999	40	788.2/40.8	167	3,577

### Age and Sex Composition

Seven-hundred eighty-nine striped bass were sampled from the 1999 commercial harvest for use in estimating age composition and sex ratio. Age was determined from scales and sex was determined by visual inspection of gonadal tissue (Sykes Method). Age ranged from 7 to 16 years and 98% were females. Approximately 96% of the sample consisted of individuals from the 1986-1991 year classes (ages 8-13) (Box 2) with the 1989 year class comprising the largest percentage of

the catch.

**Box 2. Age and Size Composition of Striped Bass Sampled From the Massachusetts 1999 Commercial Harvest.**

<b>AGE</b>	<b>YEAR CLASS</b>	<b>NO.</b>	<b>%</b>	<b>MEAN LENGTH (IN)</b>	<b>MEAN WEIGHT (LBS)</b>
<b>7</b>	<b>1992</b>	<b>9</b>	<b>1.5</b>	<b>34</b>	<b>13</b>
<b>8</b>	<b>1991</b>	<b>39</b>	<b>6.6</b>	<b>35</b>	<b>14</b>
<b>9</b>	<b>1990</b>	<b>161</b>	<b>27.4</b>	<b>36</b>	<b>17</b>
<b>10</b>	<b>1989</b>	<b>179</b>	<b>30.5</b>	<b>37</b>	<b>19</b>
<b>11</b>	<b>1988</b>	<b>103</b>	<b>17.5</b>	<b>39</b>	<b>21</b>
<b>12</b>	<b>1987</b>	<b>65</b>	<b>11.1</b>	<b>41</b>	<b>25</b>
<b>13</b>	<b>1986</b>	<b>18</b>	<b>3.1</b>	<b>42</b>	<b>27</b>
<b>14</b>	<b>1985</b>	<b>9</b>	<b>1.5</b>	<b>44</b>	<b>32</b>
<b>15</b>	<b>1984</b>	<b>3</b>	<b>0.5</b>	<b>45</b>	<b>34</b>
<b>16</b>	<b>1983</b>	<b>1</b>	<b>0.2</b>	<b>46</b>	<b>40</b>

Estimation of Effort

Total hours fished from standard catch reports and average hours per trip from voluntary logs were used to estimate effort. Estimates were increased by 17%, the fraction of non-reporters. Effort during the 40-day season (July 5-September 6, no fishing Thurs-Sat, and a one-day opening on September 19) amounted to 141,881 h fished with the trip duration averaging 5.5 h. These figures imply that 25,929 trips were conducted. This is an increase in the number of trips as compared to 1998, a result of a longer season (40 days versus 28 days in 1998). The commercial CPUE dropped sharply from the time series highs in 1997 and 1998 (Box 3).

**Box 3. Commercial CPUE Index Based on Number of Fish Harvested and Number of Fishing trips.**

<b>YEAR</b>	<b>HARVEST (Num)</b>	<b>TRIPS</b>	<b>CPUE</b>
<b>1991</b>	<b>10,400</b>	<b>17,827</b>	<b>0.58</b>
<b>1992</b>	<b>11,300</b>	<b>13,722</b>	<b>0.82</b>
<b>1993</b>	<b>13,000</b>	<b>10,593</b>	<b>1.23</b>
<b>1994</b>	<b>10,400</b>	<b>7,455</b>	<b>1.40</b>
<b>1995</b>	<b>41,200</b>	<b>28,455</b>	<b>1.45</b>
<b>1996</b>	<b>38,300</b>	<b>28,647</b>	<b>1.34</b>
<b>1997</b>	<b>44,800</b>	<b>20,621</b>	<b>2.17</b>
<b>1998</b>	<b>45,300</b>	<b>20,061</b>	<b>2.26</b>
<b>1999</b>	<b>40,060</b>	<b>25,929</b>	<b>1.57</b>

Characterization of Other Losses

Release mortality was estimated by using a hook-release mortality rate of 8% applied against the released sub-legal and legal-sized fish in Tables 1 and 1A. Total losses due to release mortality were 12,186 fish weighing approximately 121,188 pounds.

**Recreational Fishery**

Season: None

Daily bag Limit: One fish per person

Allowable Gear Type: Hook and line

Minimum Size: 28 inches total length

Licensing and Reporting Requirements: None

Harvest levels

Preliminary harvest (A+B1) and total catch (A+B1+B2) estimates were provided by the NMFS MRFSS. Massachusetts paid for approximately 4,000 additional intercept interviews which began during wave 3. A similar “add-on” has been conducted since 1988, however, prior to 1995 it began in wave 2. Reference should be made to Osborn and Salz (1994) for a description of the new trip estimation procedure and its affect on catch.

The length distribution of harvested fish was estimated from biological sampling conducted by the MRFSS program in Massachusetts. The length frequency of the legal-size releases was

estimated from information provided by the voluntary fishing logs during days outside the commercial season. The American Littoral Society's 1999 Massachusetts' release data was used to estimate size distribution of the sub-legal catch.

The preliminary estimate of total catch (including fish released alive) is 4,717,479 striped bass (Table 2), which is considerably lower than estimates of the previous two years (7,392,310 in 1998 and 5,617,124 in 1997). The preliminary estimate of total harvest is 138,190 striped bass, which is also considerably lower than the estimates of the previous two years (207,952 in 1998 and 199,371 in 1997). Total pound of the catch exceeded 27 million pounds while harvest was 2.3 million pounds (Table 2A).

### Estimation of Effort

Information from commercial catch reports, excluding those fishermen that reported selling their catch, and information from volunteer logs was used to estimate total hours fished and average hours per trip. These estimates show that 3,302,435 h were spent fishing for striped bass and trip duration averaged 4.6 h. These figures imply that 722,634 trips were made where striped bass were caught. These estimates represent a decrease of about 38% from the 1998 level of effort.

### Characterization of losses

The same methods and rates previously described (under *Characterization of Losses* in the commercial fishery section) were used to estimate recreational losses. Release mortality was 293,073 fish (1,198,036 pounds) for sub-legal size fish and 73,269 fish (828,135 pounds) for the legal-sized stripers released.

## **Scientific Collections**

About 738 striped bass, ranging in size from 12 to 28 inches, were sacrificed during 1999 as part of on-going diet studies conducted by DMF and the University of Massachusetts at Amherst.

## **Bycatch in Other Fisheries**

During 1994, DMF sea-sampling efforts identified striped bass as bycatch in a Nantucket Sound springtime trawl fishery directed at long-finned squid (*Loligo pealei*). Those bycatch estimates were about 3,100 fish (17,600 pounds). Anecdotal information was also reported for this fishery which suggested that striped bass bycatch ranged from 8,000 pounds per day, with up to single tows landing 19,000 pounds. DMF personnel have sea-sampled this fishery during 1995-1999 and have observed only incidental catches of striped bass. Limited sampling and low catch rates make it unreasonable to extrapolate sample information. DMF will continue to monitor and investigate potential sources of striped bass bycatch during 2000.



### **Estimated Total Losses**

Total estimated loss of striped bass during 1999 was 557,943 fish weighing 4,778,142 pounds (Box 4), which reflects a significant decrease (33% by number) from losses in 1998 (836,952 fish, 7,051,967 pounds). The majority of losses, 90% by number and 81% by weight, was attributed to combined losses in the recreational fishery.

#### **Box 4. Preliminary estimates of striped bass losses occurring in Massachusetts waters during 1997.**

<b>COMMERCIAL HARVEST RELEASE MORTALITY</b>	<b><u>NUMBER</u> 40,838 11,834</b>	<b><u>POUNDS</u> 788,171 117,695</b>	<b><u>MEAN WT.</u> 19.3 9.9</b>
<b>RECREATIONAL HARVEST RELEASE MORTALITY</b>	<b>138,190 366,343</b>	<b>1,843,824 2,026,172</b>	<b>13.3 5.5</b>
<b>SCIENTIFIC</b>	<b>738</b>	<b>2,280</b>	<b>3.1</b>
<b>TOTALS</b>	<b>557,943</b>	<b>4,778,142</b>	<b>8.6</b>

### **Required Fishery Independent Monitoring Programs**

#### **Massachusetts Tagging Study**

The Massachusetts Division of Marine Fisheries (DMF) joined the Striped Bass Cooperative State-Federal Coast-wide Tagging Study in 1991. The study's primary objective has been to develop an integrated database of tag releases and recoveries that will provide current information related to striped bass mortality and migration rates. The vast majority of striped bass tagged prior to 1991 (the tagging study began in 1986) have ranged from 18 to 28 inches in length. Since Atlantic coastal fisheries had employed minimum sizes of 28-36 inches, resulting mortality estimates from these data may understate the effects fishing has on larger striped bass. The Massachusetts tagging effort has therefore focused on the tag and release of larger fish that reach coast-wide legal sizes. To accomplish this job, the DMF have contracted several select charter boat captains to take DMF personnel on board to tag and release their catch during regularly scheduled fishing trips. All fish are caught in the fall by trolling artificial baits in shoal areas around Nantucket Island. Tag summary statistics are presented in Box 5.

**Box 5. Tag summary statistics.**

<b>YEAR</b>	<b>TRIPS</b>	<b>BOATS</b>	<b>NUMBER TAGGED</b>	<b>AVE. LENGTH</b>	<b>SE</b>	<b><u>LENGTH RANGE</u></b>	
						<b>MIN.</b>	<b>MAX.</b>
<b>1991</b>	<b>17</b>	<b>4</b>	<b>388</b>	<b>817</b>	<b>5.4</b>	<b>534</b>	<b>1300</b>
<b>1992</b>	<b>29</b>	<b>3</b>	<b>899</b>	<b>798</b>	<b>4.2</b>	<b>524</b>	<b>1267</b>
<b>1993</b>	<b>15</b>	<b>2</b>	<b>678</b>	<b>784</b>	<b>4.8</b>	<b>515</b>	<b>1210</b>
<b>1994</b>	<b>13</b>	<b>2</b>	<b>375</b>	<b>735</b>	<b>4.8</b>	<b>548</b>	<b>1028</b>
<b>1995</b>	<b>11</b>	<b>2</b>	<b>477</b>	<b>767</b>	<b>5.2</b>	<b>470</b>	<b>1178</b>
<b>1996</b>	<b>8</b>	<b>2</b>	<b>186</b>	<b>748</b>	<b>4.5</b>	<b>541</b>	<b>1077</b>
<b>1997</b>	<b>9</b>	<b>2</b>	<b>312</b>	<b>773</b>	<b>6.4</b>	<b>485</b>	<b>1090</b>
<b>1998</b>	<b>12</b>	<b>2</b>	<b>400</b>	<b>797</b>	<b>4.8</b>	<b>597</b>	<b>1055</b>
<b>1999</b>	<b>16</b>	<b>2</b>	<b>473</b>	<b>777</b>	<b>4.4</b>	<b>594</b>	<b>1108</b>

**Table 1.** Estimated size distribution of the 1999 Massachusetts *commercial* striped bass catch (NUMBERS OF FISH)

TL (in)	Released sub-legal	Sold	Consumed	Released legal-sized	Total	Percent	Cumulative Percent
15							
16							
17							
18							
19	3,510				3,510	1.76	1.76
20	0				0	0.00	1.76
21	0				0	0.00	1.76
22	15,794				15,794	7.92	9.67
23	0				0	0.00	9.67
24	3,510				3,510	1.76	11.43
25	0				0	0.00	11.43
26	15,794				15,794	7.92	19.35
27	10,529				10,529	5.28	24.63
28	12,284				12,284	6.16	30.78
29	5,265		27		5,292	2.65	33.44
30	10,529		54	613	11,196	5.61	39.05
31	5,265		297	306	5,868	2.94	41.99
32	29,833		486	1,991	32,310	16.19	58.18
33	12,284	52	108	0	12,444	6.24	64.42
34	8,774	2,442	540	460	12,216	6.12	70.54
35		5,040	243	460	5,742	2.88	73.42
36		5,715	1,376	2,911	10,002	5.01	78.43
37		5,819	1,592	1,532	8,943	4.48	82.91
38		6,962	755	766	8,484	4.25	87.16
39		4,780	944	1,072	6,797	3.41	90.57
40		2,806	1,403	1,532	5,741	2.88	93.45
41		1,767	782	613	3,162	1.58	95.03
42		1,611	540	460	2,610	1.31	96.34
43		1,559	486	766	2,810	1.41	97.75
44		935	135	0	1,070	0.54	98.29
45		727	243	0	970	0.49	98.77
46		52	162	306	520	0.26	99.03
47		468	216	0	683	0.34	99.37
48		104	81	153	338	0.17	99.54
49			108	0	108	0.05	99.60
50			81	153	234	0.12	99.72
51			54	0	54	0.03	99.74
52			0	153	153	0.08	99.82
53			0	0	0	0.00	99.82
54			0	0	0	0.00	99.82
55			27	0	27	0.01	99.83
56			0	153	153	0.08	99.91
57			0	153	153	0.08	99.99
58			0	0	0	0.00	99.99
59			27	0	27	0.01	100.00
60							
Totals:	133,372	40,838	10,765	14,553	199,528		
Average size:	28.7	38.1	38.7	37.7	31.8		

**Table 1a.** Estimated size distribution of the 1999 Massachusetts *commercial* striped bass catch (POUNDS OF FISH)

TL (in)	Released sub-legal	Sold	Consumed	Released legal-sized	Total	Percent	Cumulative Percent
15							
16							
17							
18							
19	8,661				8,661	0.35	0.35
20	0				0	0.00	0.35
21	0				0	0.00	0.35
22	60,232				60,232	2.42	2.77
23	0				0	0.00	2.77
24	17,330				17,330	0.70	3.47
25	0				0	0.00	3.47
26	98,907				98,907	3.98	7.44
27	73,756				73,756	2.97	10.41
28	95,860				95,860	3.85	14.26
29	45,594		234		45,828	1.84	16.11
30	100,844		517	5,869	107,229	4.31	20.42
31	55,578		3,133	3,234	61,945	2.49	22.91
32	346,070		5,633	23,101	374,805	15.07	37.98
33	156,132	644	1,372	0	158,147	6.36	44.34
34	121,858	33,071	7,494	6,382	168,806	6.79	51.12
35		74,388	3,675	6,956	85,019	3.42	54.54
36		91,716	22,644	47,898	162,258	6.52	61.07
37		101,298	28,416	27,346	157,059	6.31	67.38
38		131,182	14,597	14,800	160,578	6.46	73.84
39		97,286	19,708	22,380	139,375	5.60	79.44
40		61,560	31,567	34,468	127,595	5.13	84.57
41		41,708	18,944	14,836	75,488	3.04	87.61
42		40,849	14,034	11,952	66,835	2.69	90.29
43		42,391	13,544	21,362	77,297	3.11	93.40
44		27,232	4,028	0	31,260	1.26	94.66
45		22,641	7,751	0	30,392	1.22	95.88
46		1,726	5,516	10,439	17,681	0.71	96.59
47		16,561	7,839	0	24,400	0.98	97.57
48		3,918	3,129	5,922	12,969	0.52	98.10
49			4,436	0	4,436	0.18	98.27
50			3,532	6,686	10,218	0.41	98.68
51			2,498	0	2,498	0.10	98.78
52			0	7,511	7,511	0.30	99.09
53			0	0	0	0.00	99.09
54			0	0	0	0.00	99.09
55			1,563	0	1,563	0.06	99.15
56			0	9,360	9,360	0.38	99.53
57			0	9,865	9,865	0.40	99.92
58			0	0	0	0.00	99.92
59			1,925	0	1,925	0.08	100.00
60							
Totals:	1,180,822	788,171	227,726	290,368	2,487,086		
Ave. size:	8.4	19.5	20.4	18.9	11.4		

**Table 2.** Estimated size distribution of the 1999 Massachusetts *recreational* striped bass catch (NUMBERS OF FISH)

Total Length (in)	Released Sublegal	Consumed	Released Legal	Total	Percent	Cumulative Percent
11						
12						
13						
14	6,035			6,035	0.13	0.13
15	24,141			24,141	0.51	0.64
16	72,424			72,424	1.54	2.17
17	114,671			114,671	2.43	4.61
18	235,377			235,377	4.99	9.60
19	241,412			241,412	5.12	14.71
20	549,213			549,213	11.64	26.35
21	422,471			422,471	8.96	35.31
22	229,342			229,342	4.86	40.17
23	380,224			380,224	8.06	48.23
24	398,330			398,330	8.44	56.68
25	446,613			446,613	9.47	66.14
26	313,836	7,808		321,644	6.82	72.96
27	229,342	14,151		243,492	5.16	78.12
28		14,690	193,140	207,830	4.41	82.53
29		8,029	149,528	157,557	3.34	85.87
30		13,308	112,146	125,454	2.66	88.53
31		9,231	80,994	90,225	1.91	90.44
32		3,441	93,455	96,896	2.05	92.49
33		7,918	56,073	63,991	1.36	93.85
34		5,693	56,073	61,766	1.31	95.16
35		14,634	18,691	33,325	0.71	95.87
36		8,720	87,225	95,944	2.03	97.90
37		10,793	24,921	35,714	0.76	98.66
38		3,911	24,921	28,832	0.61	99.27
39		4,754	12,461	17,214	0.36	99.63
40		1,175	6,230	7,405	0.16	99.79
41		0		0	0.00	99.79
42		0		0	0.00	99.79
43		4,975		4,975	0.11	99.89
44		0		0	0.00	99.89
45		0		0	0.00	99.89
46		4,975		4,975	0.11	100.00
47		0		0	0.00	100.00
48		0		0	0.00	100.00
49						
50						
Totals:	3,663,431	138,190	915,858	4,717,479		
Average size:	22.2	32.8	31.4	24.3		

**Table 2a.** Estimated size distribution of the 1999 Massachusetts *recreational* striped bass catch (POUNDS OF FISH)

Total Length (in)	Released Sublegal	Consumed	Released Legal	Total	Percent	Cumulative Percent
11						
12						
13						
14	6,015			6,015	0.02	0.02
15	29,530			29,530	0.11	0.13
16	107,299			107,299	0.39	0.53
17	203,394			203,394	0.75	1.27
18	494,708			494,708	1.82	3.10
19	595,743			595,743	2.19	5.29
20	1,578,259			1,578,259	5.81	11.10
21	1,403,283			1,403,283	5.16	16.26
22	874,610			874,610	3.22	19.48
23	1,654,580			1,654,580	6.09	25.57
24	1,966,835			1,966,835	7.24	32.81
25	2,489,384			2,489,384	9.16	41.97
26	1,965,328	48,894		2,014,222	7.41	49.38
27	1,606,490	99,122		1,705,612	6.28	55.66
28		114,630	1,507,163	1,621,793	5.97	61.63
29		69,532	1,294,962	1,364,494	5.02	66.65
30		127,453	1,074,066	1,201,520	4.42	71.07
31		97,450	855,030	952,480	3.51	74.58
32		39,915	1,084,093	1,124,008	4.14	78.72
33		100,641	712,681	813,321	2.99	81.71
34		79,069	778,731	857,801	3.16	84.87
35		221,505	282,907	504,412	1.86	86.72
36		143,496	1,435,403	1,578,899	5.81	92.53
37		192,660	444,871	637,531	2.35	94.88
38		75,564	481,527	557,090	2.05	96.93
39		99,215	260,066	359,281	1.32	98.25
40		26,429	140,184	166,613	0.61	98.87
41		0		0	0.00	98.87
42		0		0	0.00	98.87
43		138,745		138,745	0.51	99.38
44		0		0	0.00	99.38
45		0		0	0.00	99.38
46		169,503		169,503	0.62	100.00
47						
48						
49						
50						
Totals:	14,975,457	1,843,824	10,351,683	27,170,965		
Average size:	3.9	12.5	11.0	5.1		